

# IRT Analysis

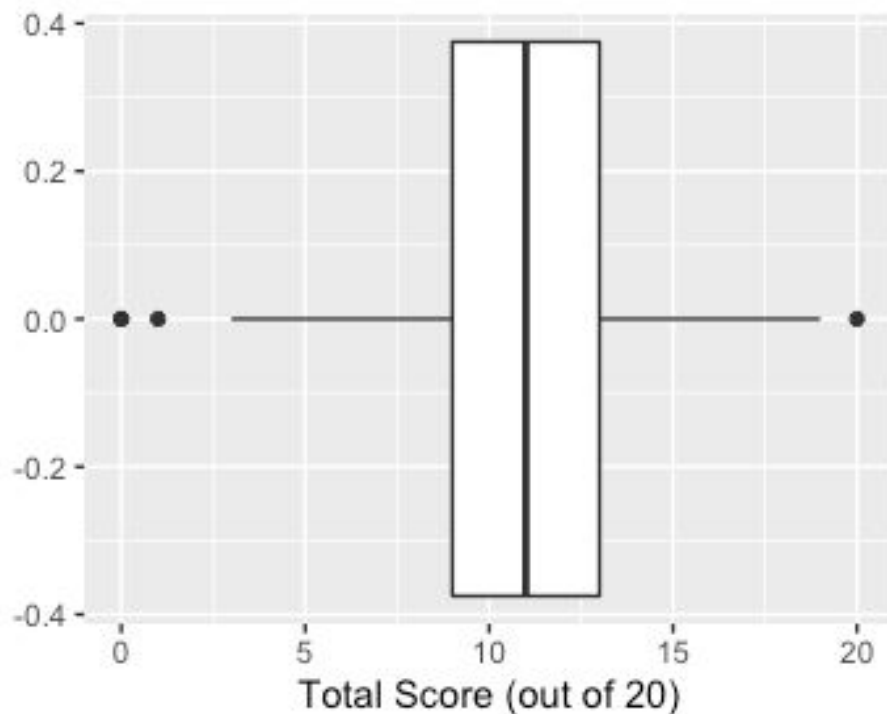
ES150, 250, 350 Online IBA

# Grammar

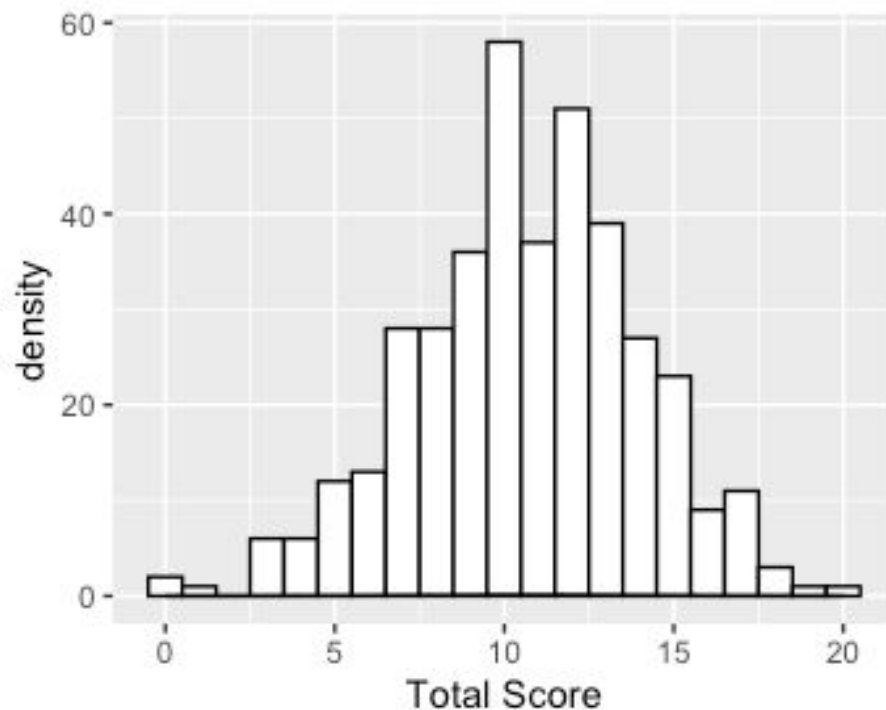
ES150

# EDA - score distribution

ES150 Online IBA Grammar

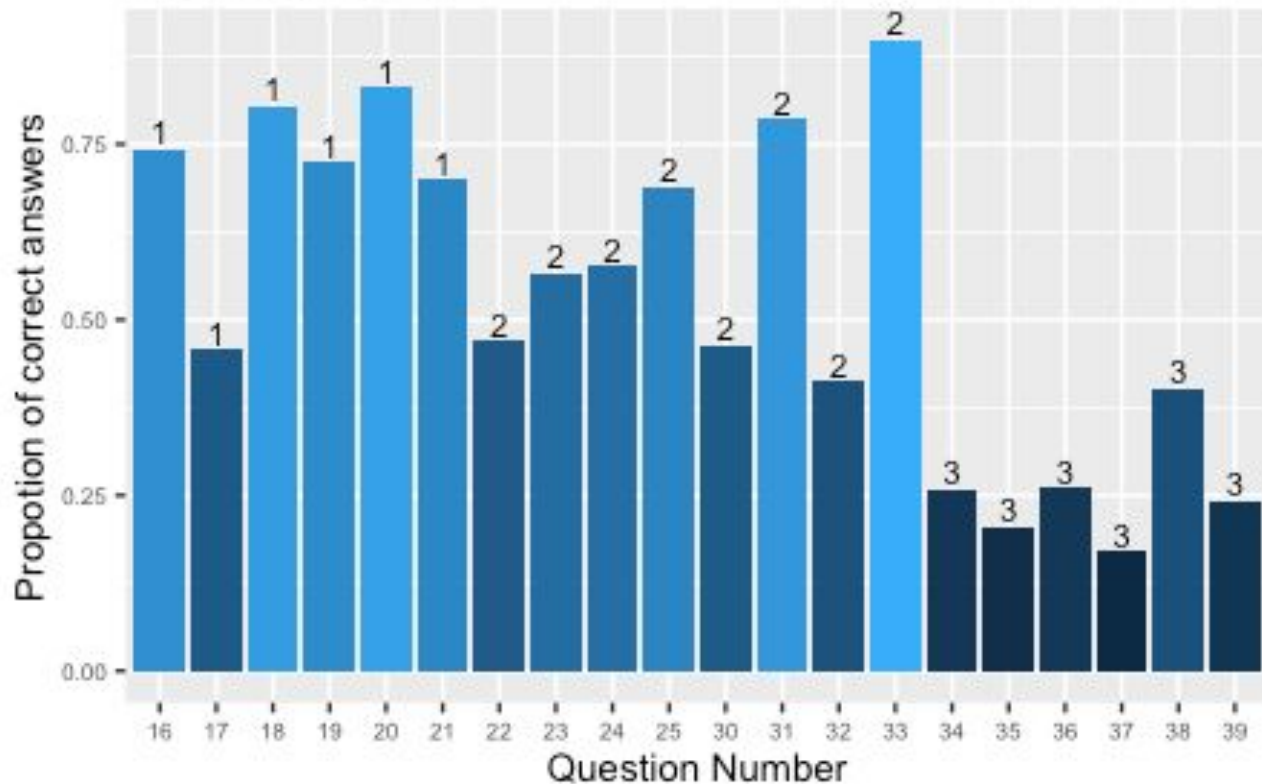


ES150 Online IBA Grammar



# EDA - 正答率

ES150 Online IBA



Min: 0.1709

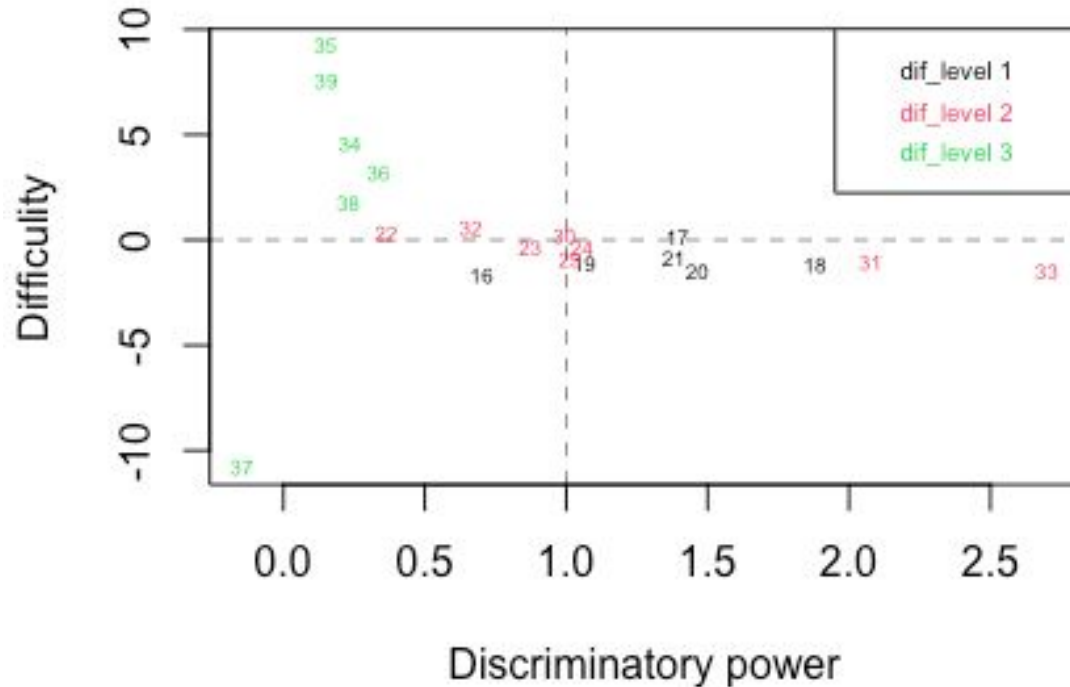
Median: 0.5179

Mean: 0.5329

Max: 0.8980

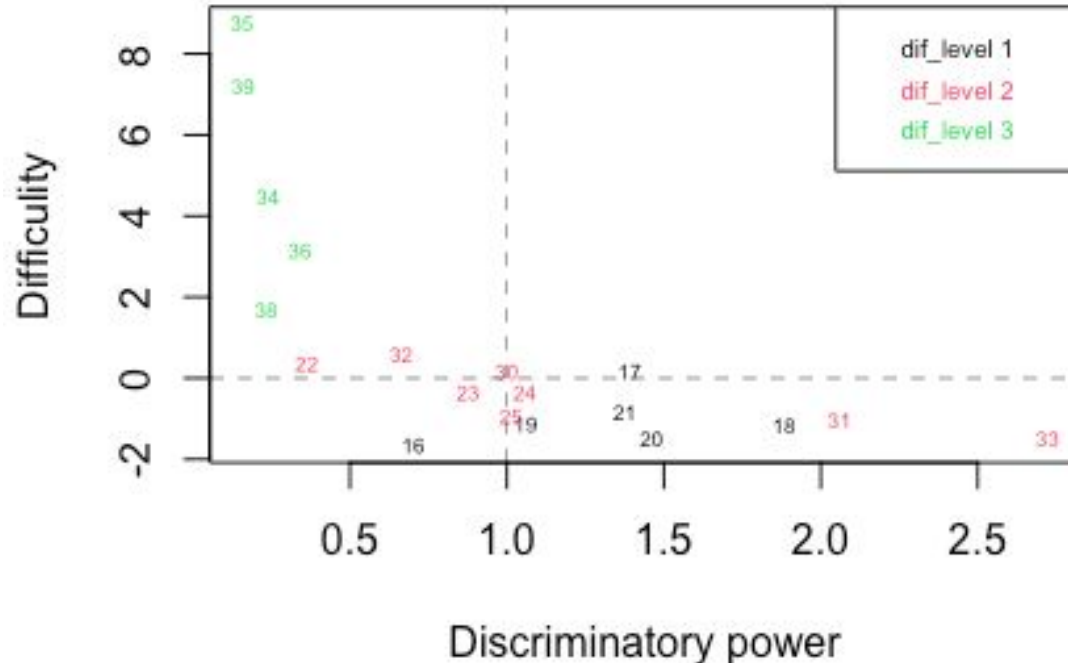
Label = difficulty

# Discriminatory power - Difficulty plot



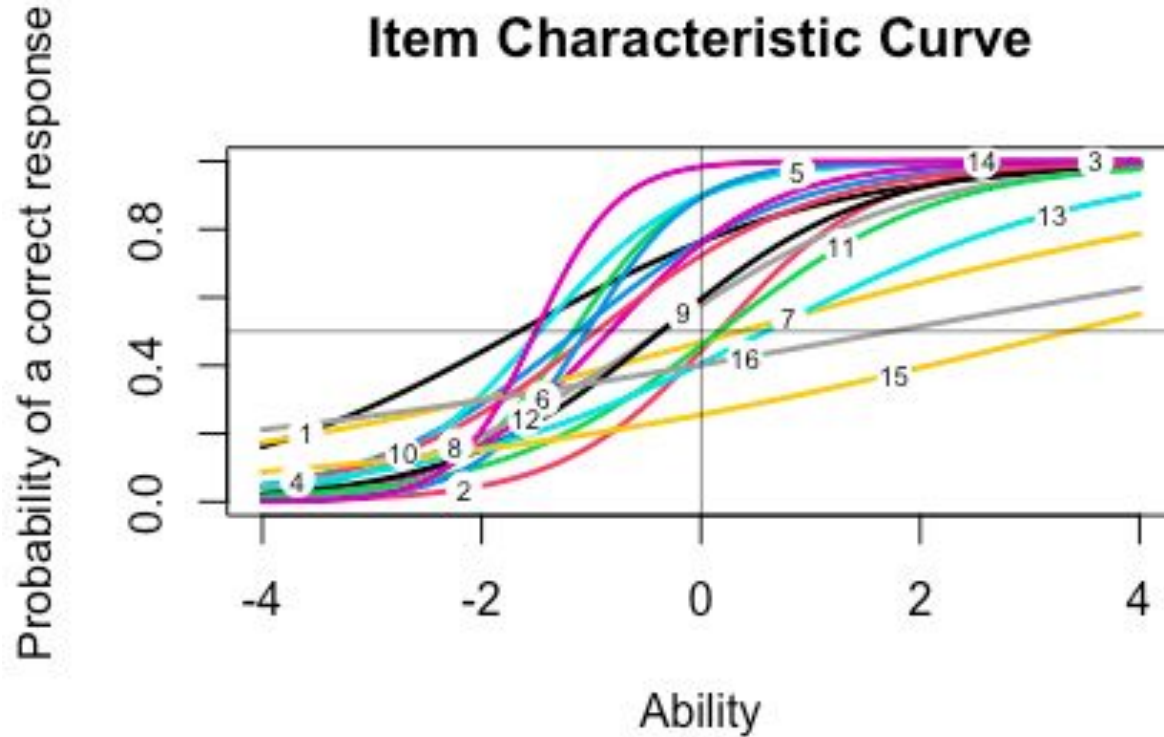
- Difficulty range is too wide
- Outliers (# 34, 35, 37, 39) need to be removed

# Discriminatory power - Difficulty plot (outliers removed)



- Strong discriminatory power (>1.5) with moderate level of difficulty for 18, 31, 33
- 17, 20, 21 also display relatively strong discriminatory power
- Difficulty: good range, mostly between -2 and 1

# Item Characteristic Curve - Overview

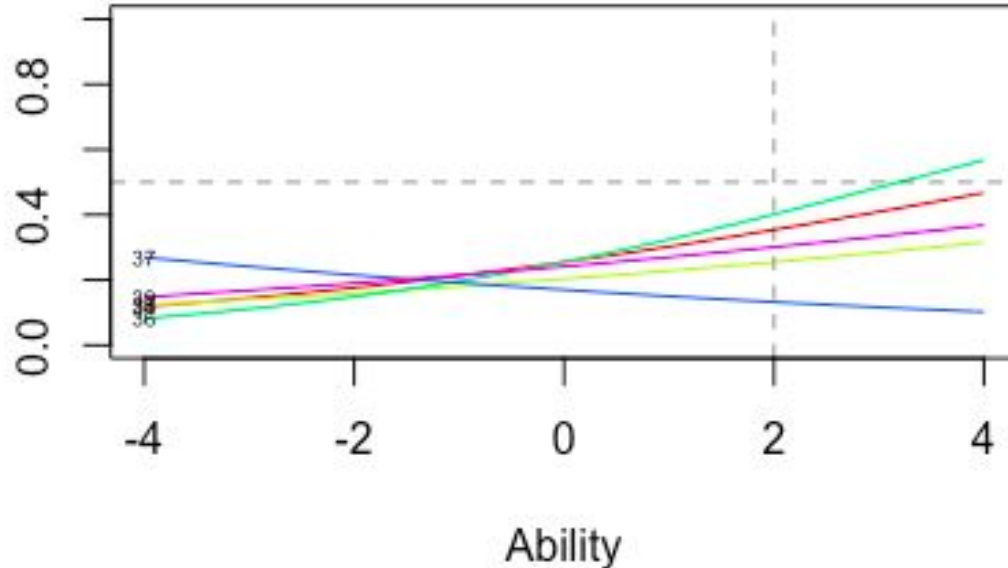




# Item Characteristic Curve - Selected Questions 2

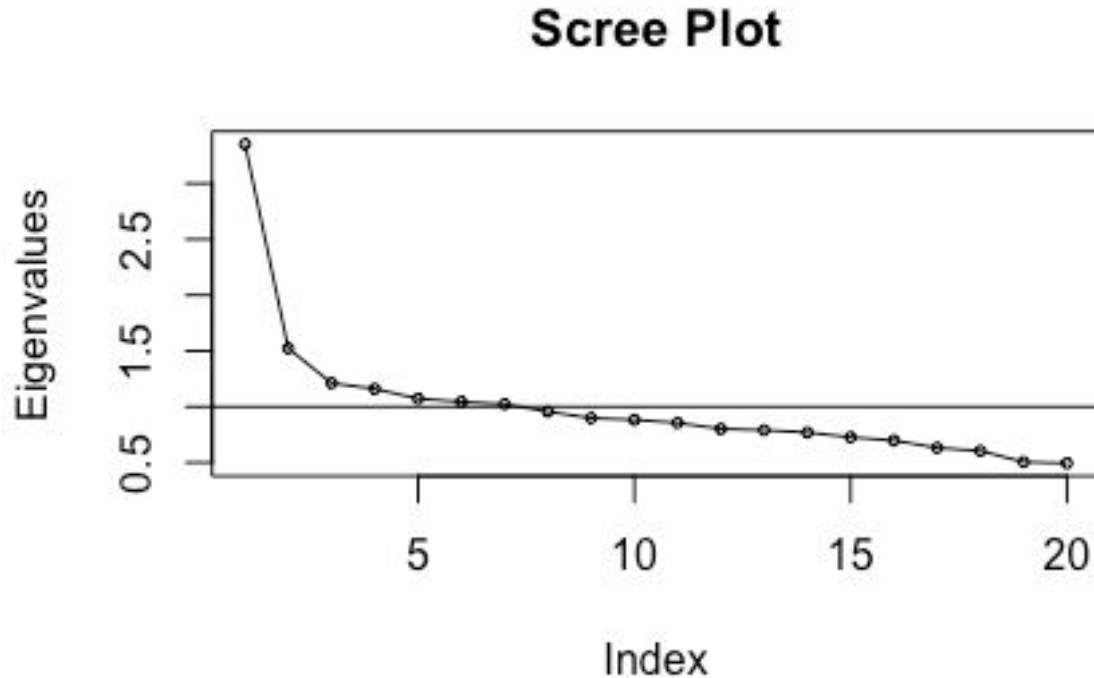
Probability of a correct response

ICC for selected questions



- Question 34, 35, 36, 37, 39
- Select the questions that more than half of the students with ability = 2 got wrong
- These questions are “too difficult”
- # 37 has a negative slope, meaning students with higher ability are more likely to get wrong

# Scree Plot

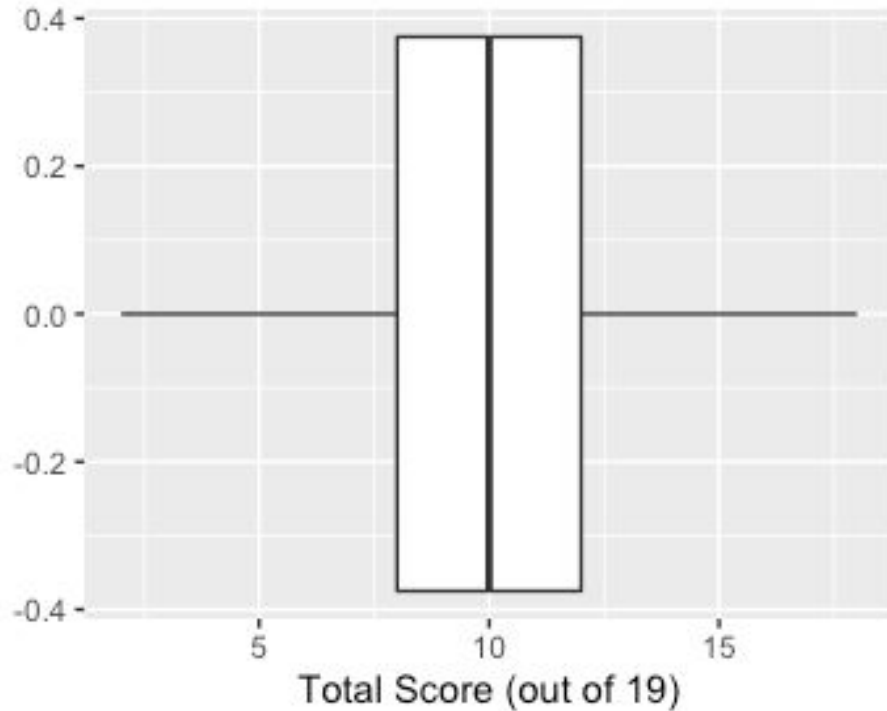


- Since 7 of the items have eigenvalues  $> 1$ , we only need 7 items to verify unidimensionality

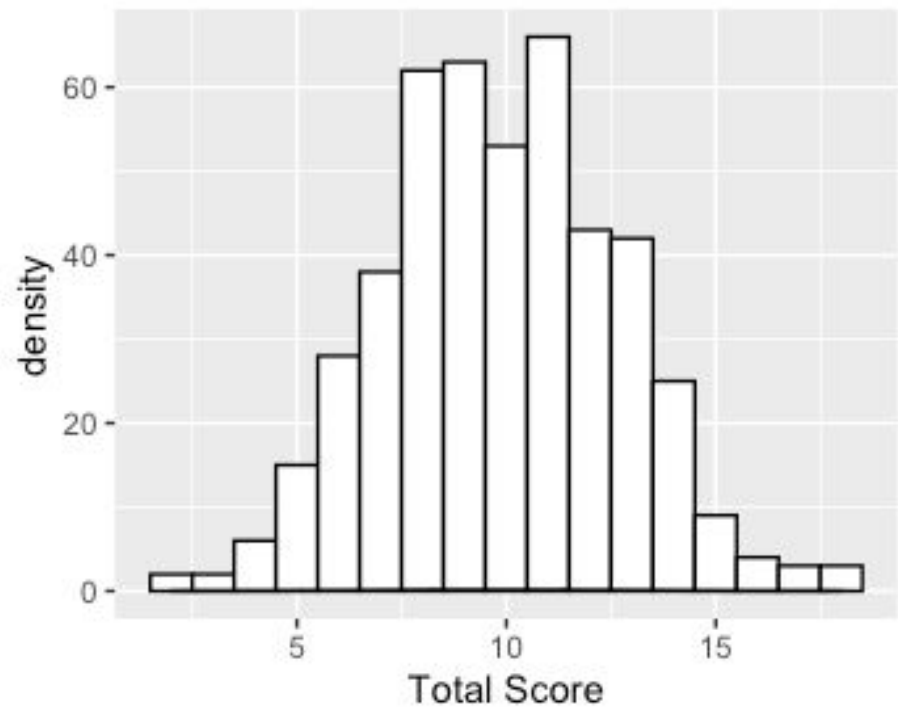
ES250

# EDA - score distribution

ES250 Online IBA Grammar

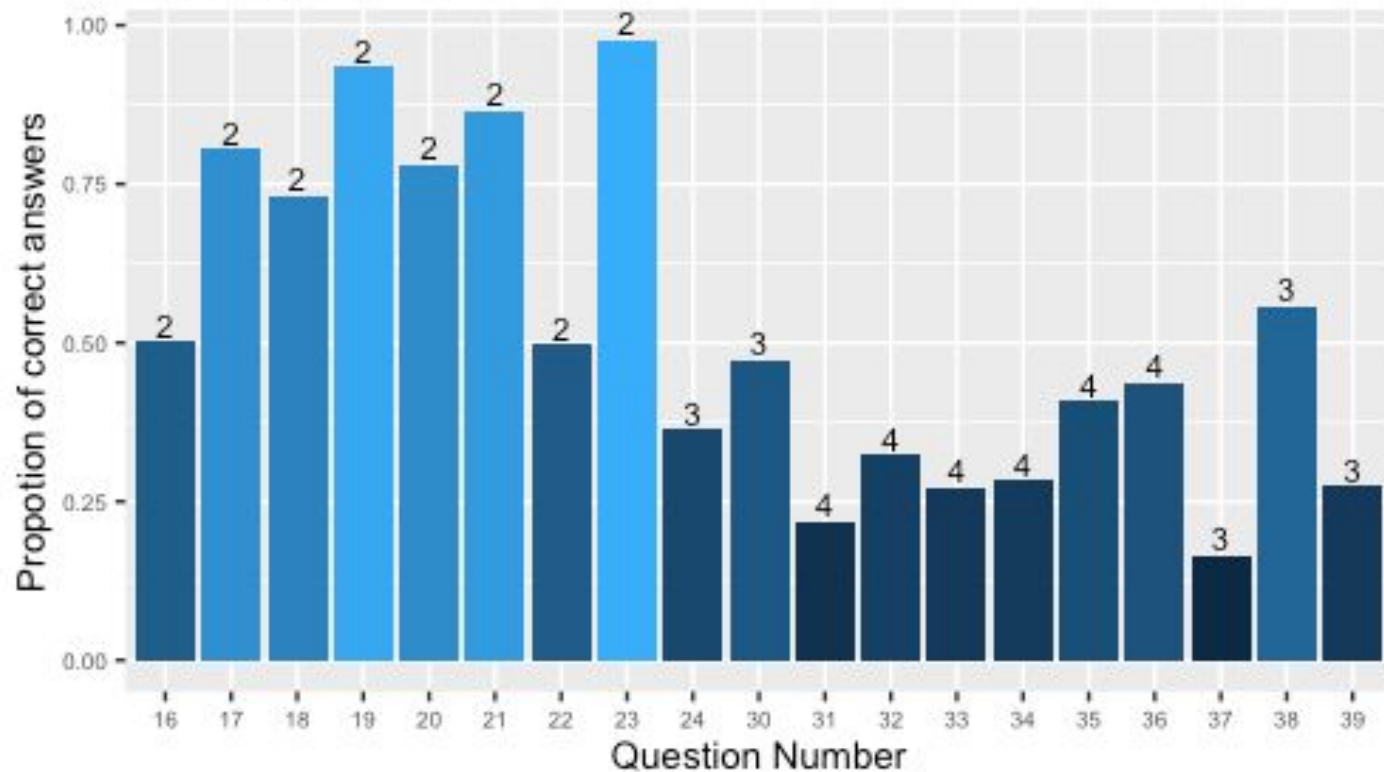


ES250 Online IBA Grammar



# EDA - 正答率

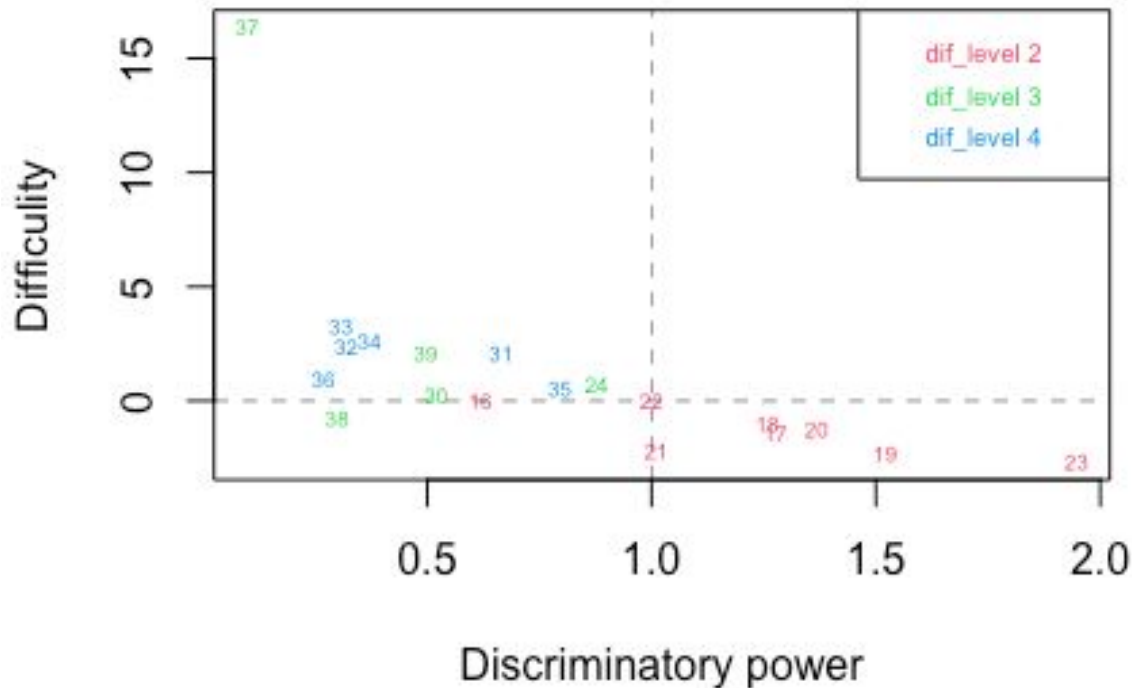
ES250 Online IBA



Min: 0.1659  
Median: 0.4720  
Mean: 0.5193  
Max: 0.9763

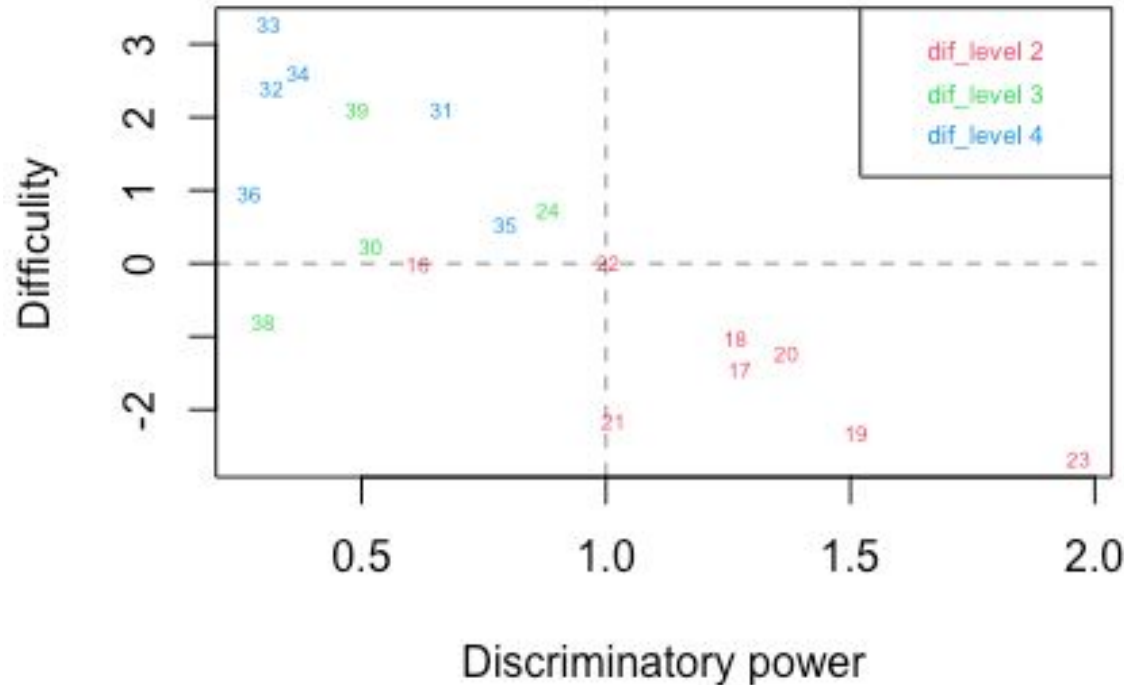
Label = difficulty

# Discriminatory power - Difficulty plot



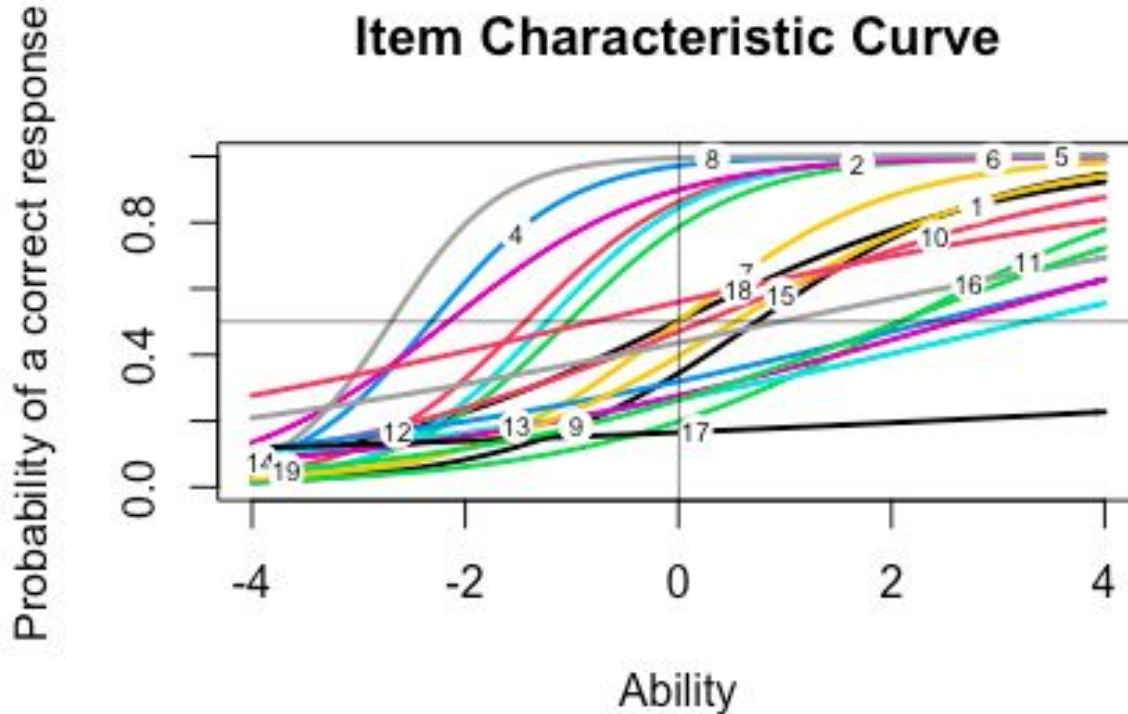
- Difficulty range is too wide
- Outliers (# 37) needs to be removed

# Discriminatory power - Difficulty plot (outliers removed)



- Only #19 and 20 display discriminatory power >1.5 but too small difficulty values
- Discriminatory power: majority <1.0, in range of 0-2
- Difficulty: wide range of -3-3

# Item Characteristic Curve - Overview

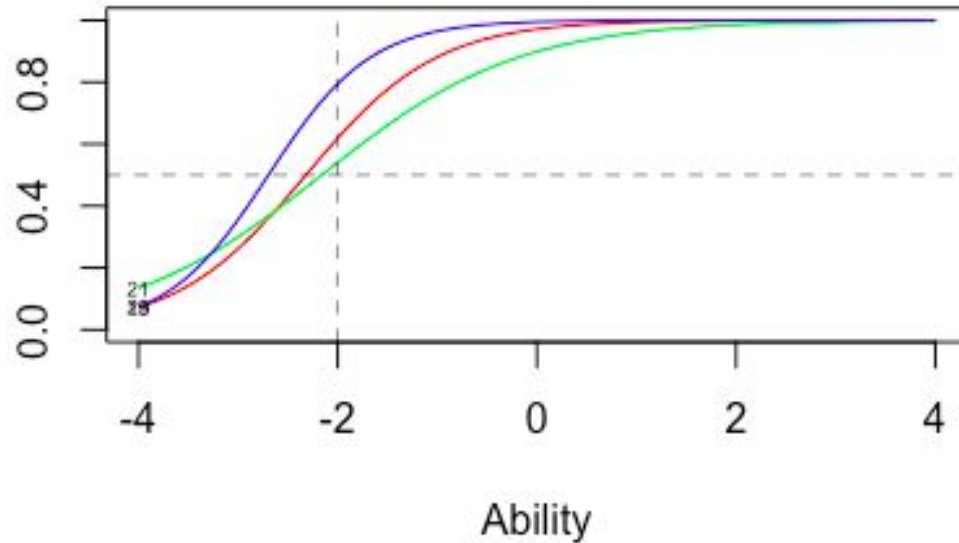




# Item Characteristic Curve - Selected Questions

Probability of a correct response

ICC for selected questions

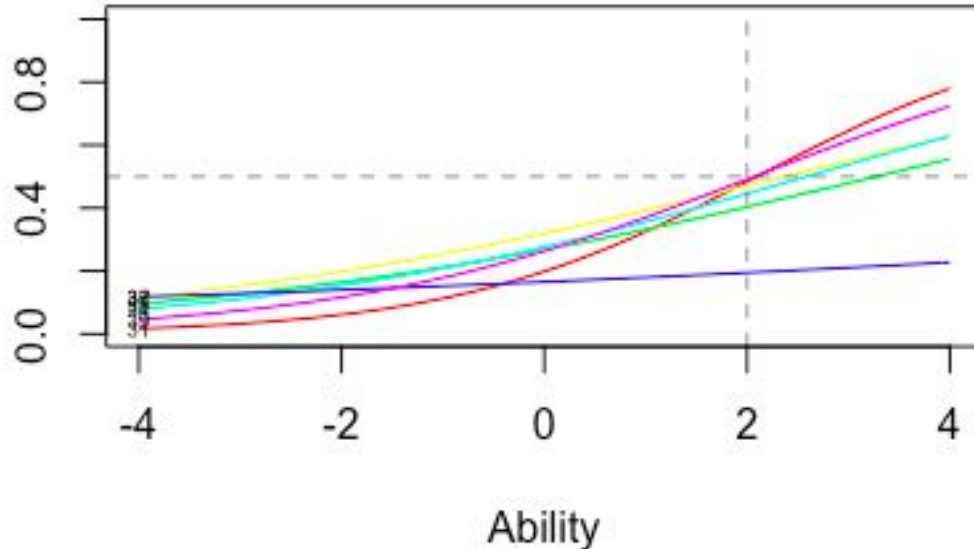


- Question 19, 21, 23
- Select the questions that more than half of the students with ability = -2 got correct
- These questions are “too easy”

# Item Characteristic Curve - Selected Questions 2

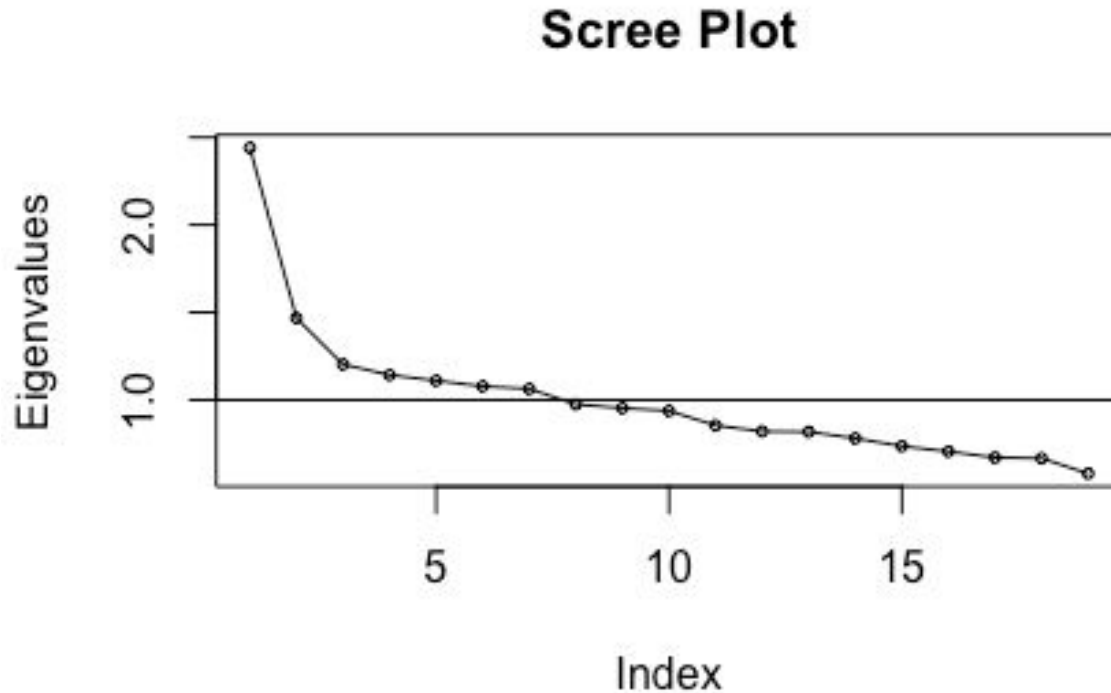
Probability of a correct response

ICC for selected questions



- Question 31, 32, 33, 34, 37, 39
- Select the questions that more than half of the students with ability = 2 got wrong
- These questions are “too difficult”

# Scree Plot

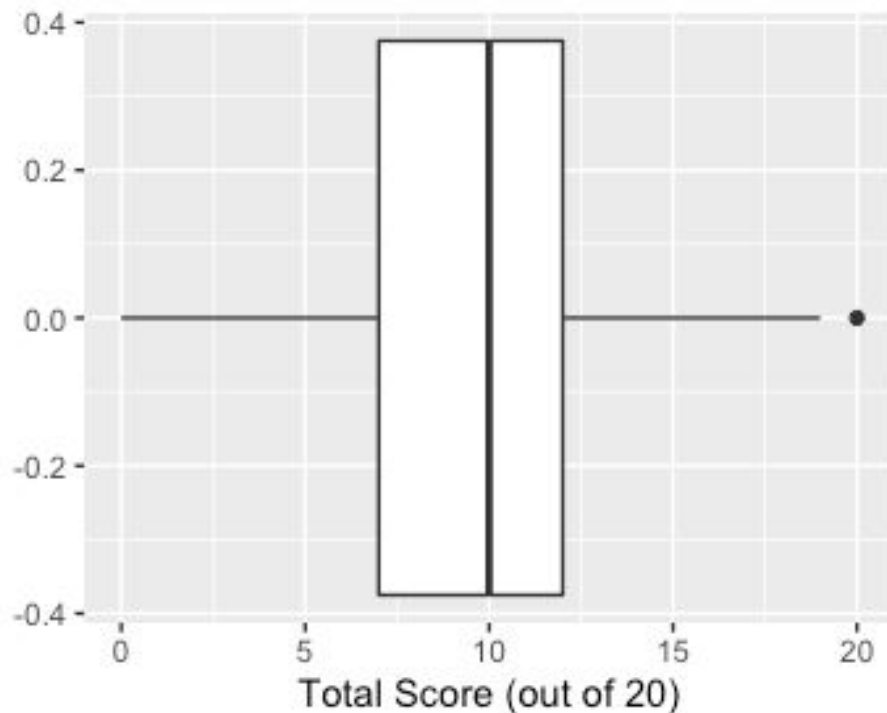


- Since 7 of the items have eigenvalues  $> 1$ , we only need 7 items to verify unidimensionality

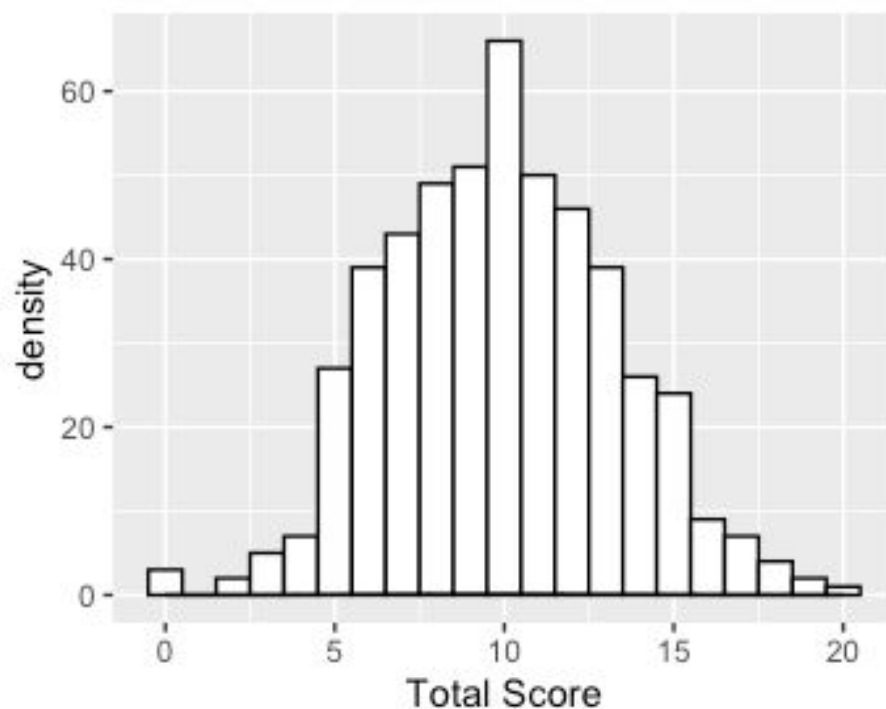
ES350

# EDA - score distribution

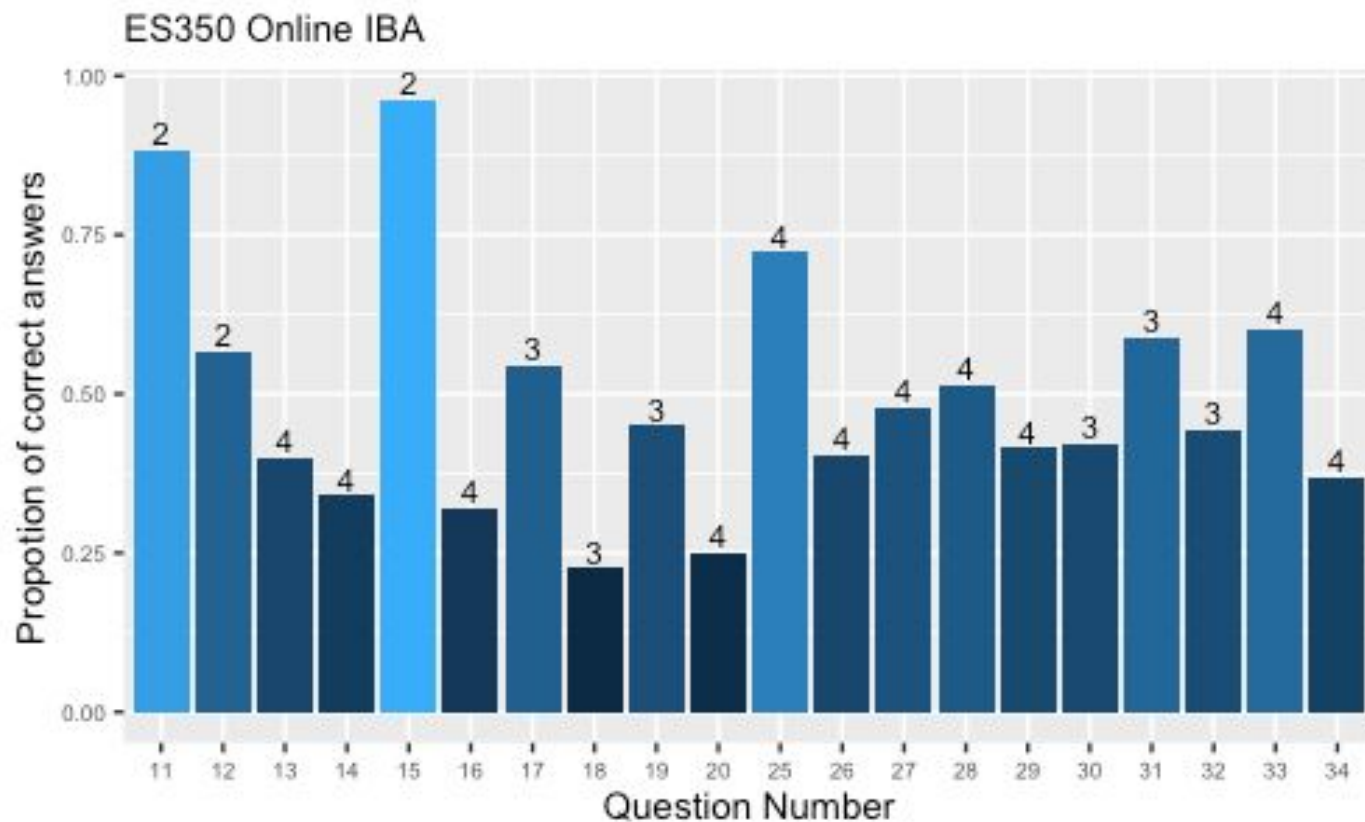
ES350 Online IBA Grammar



ES350 Online IBA Grammar

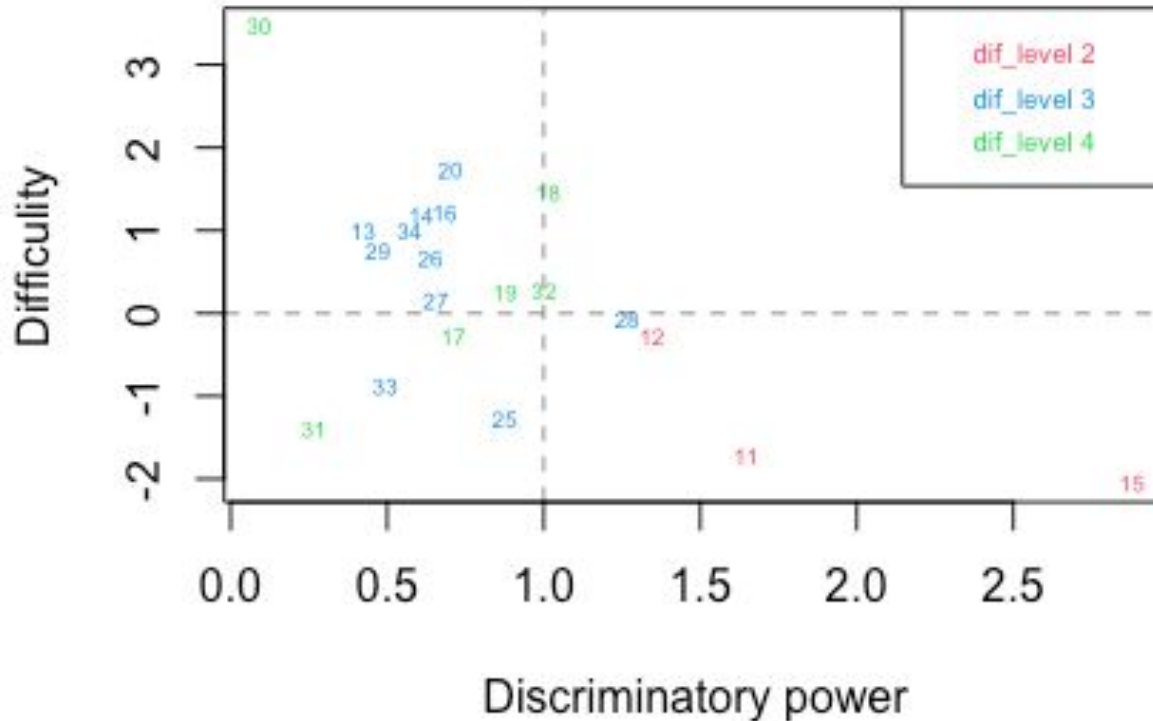


# EDA - 正答率



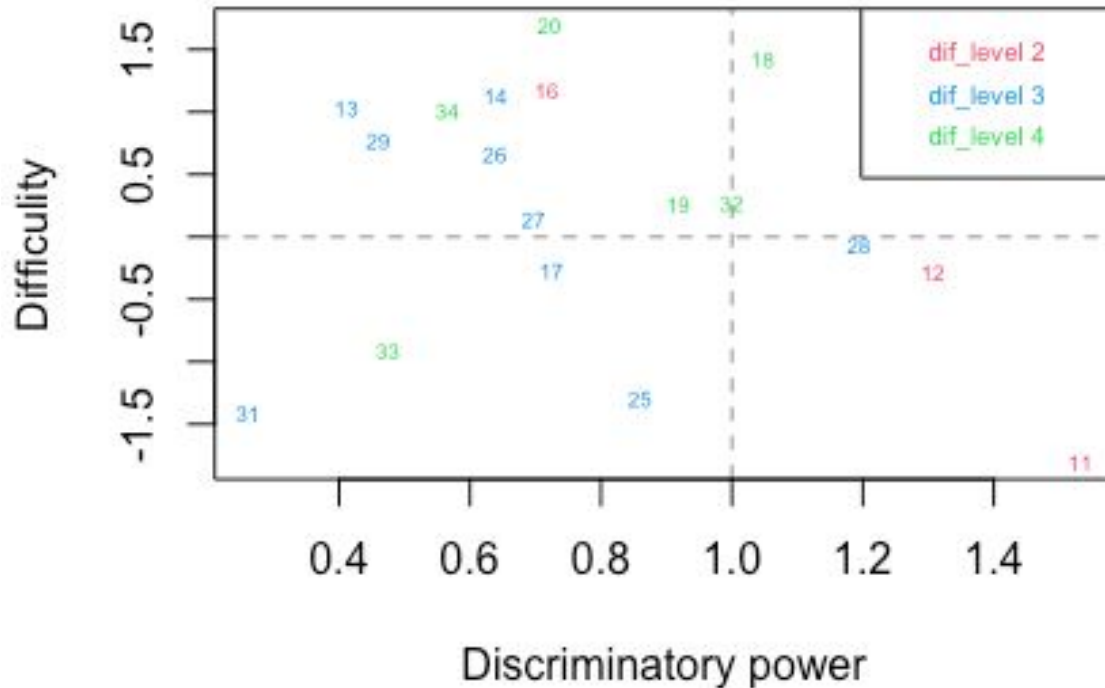
Min: 0.2260  
Median: 0.4470  
Mean: 0.4954  
Max: 0.9620

# Discriminatory power - Difficulty plot



- Difficulty range is too wide
- Outliers (# 15, 30) need to be removed

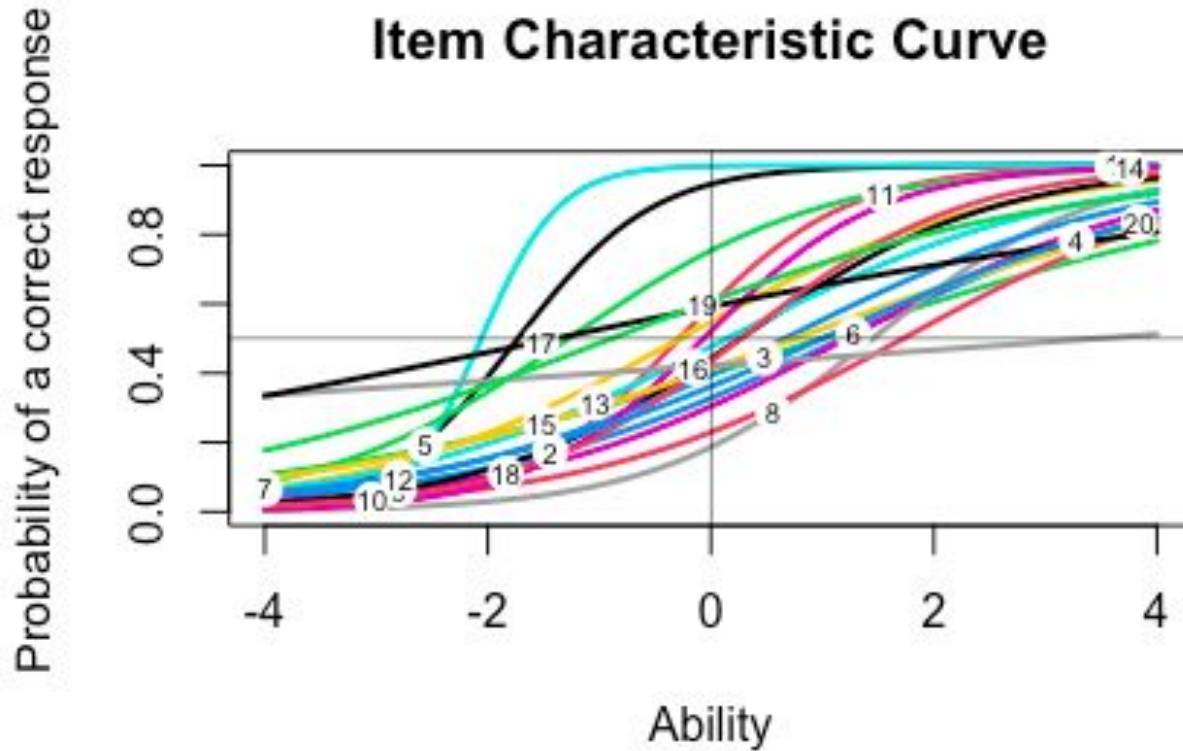
# Discriminatory power - Difficulty plot (outliers removed)



- Discriminatory power: in the range of -1.5 - 1.5
- Difficulty: overall range between 0.2 and 1.6, majority < 1.0



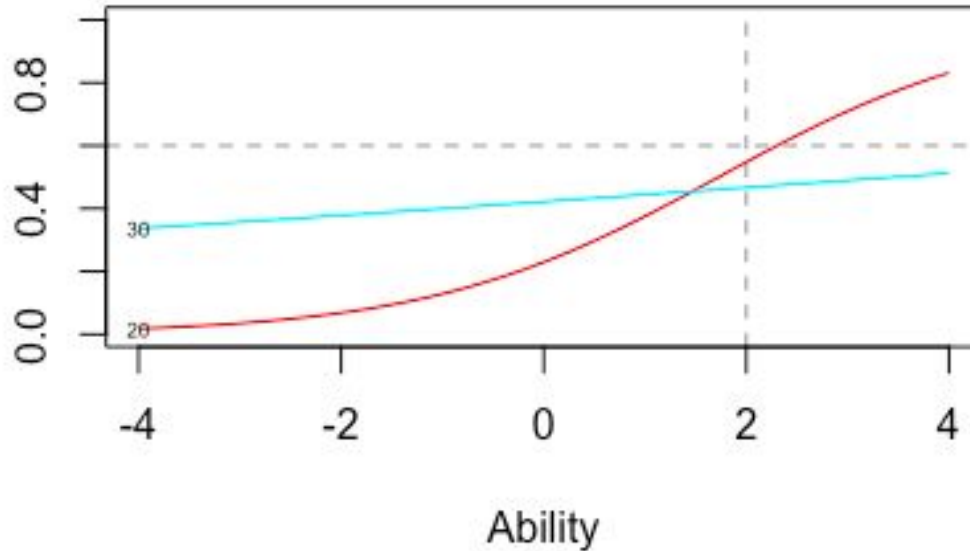
# Item Characteristic Curve - Overview



# Item Characteristic Curve - Selected Questions 2

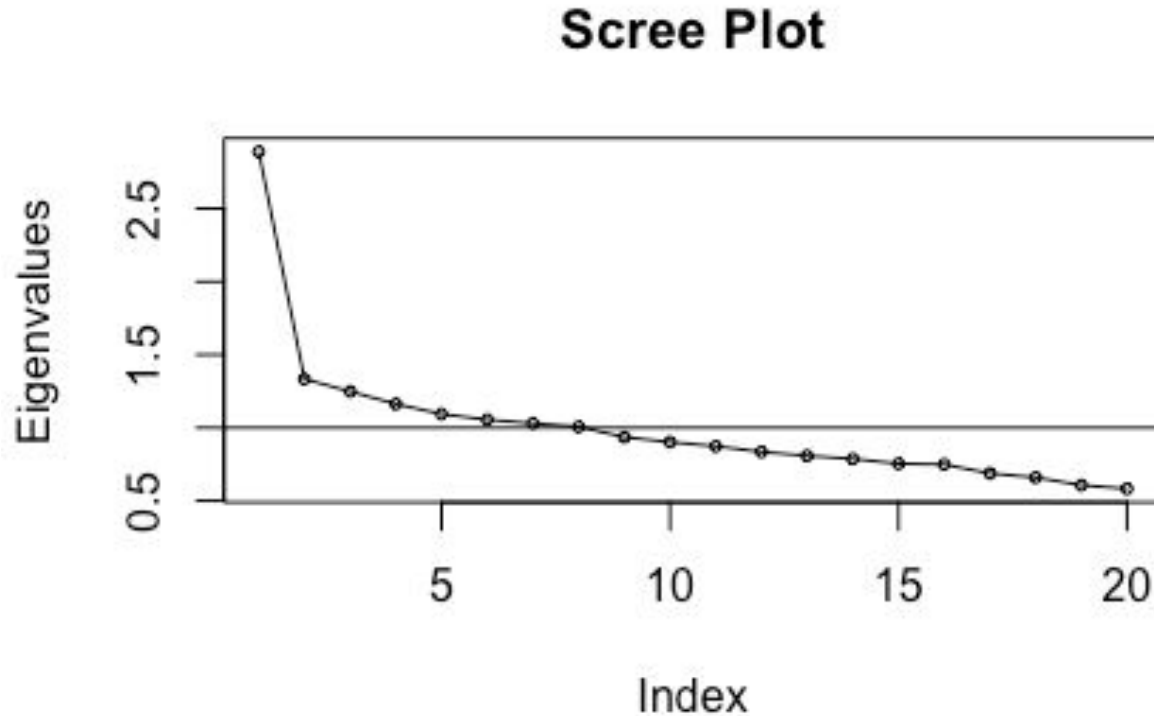
Probability of a correct response

ICC for selected questions



- Question 20, 30
- Select the questions that more than 40% of the students with ability = 2 got wrong
- These questions are “too difficult”

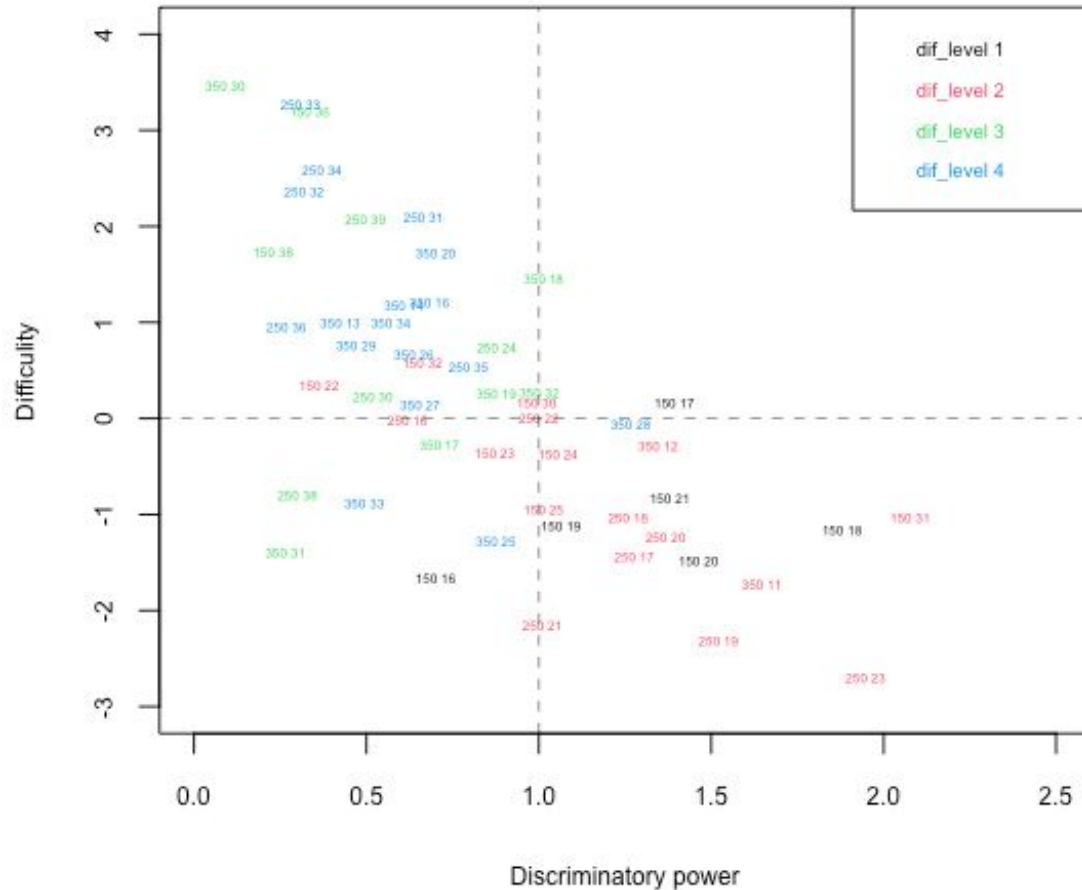
# Scree Plot



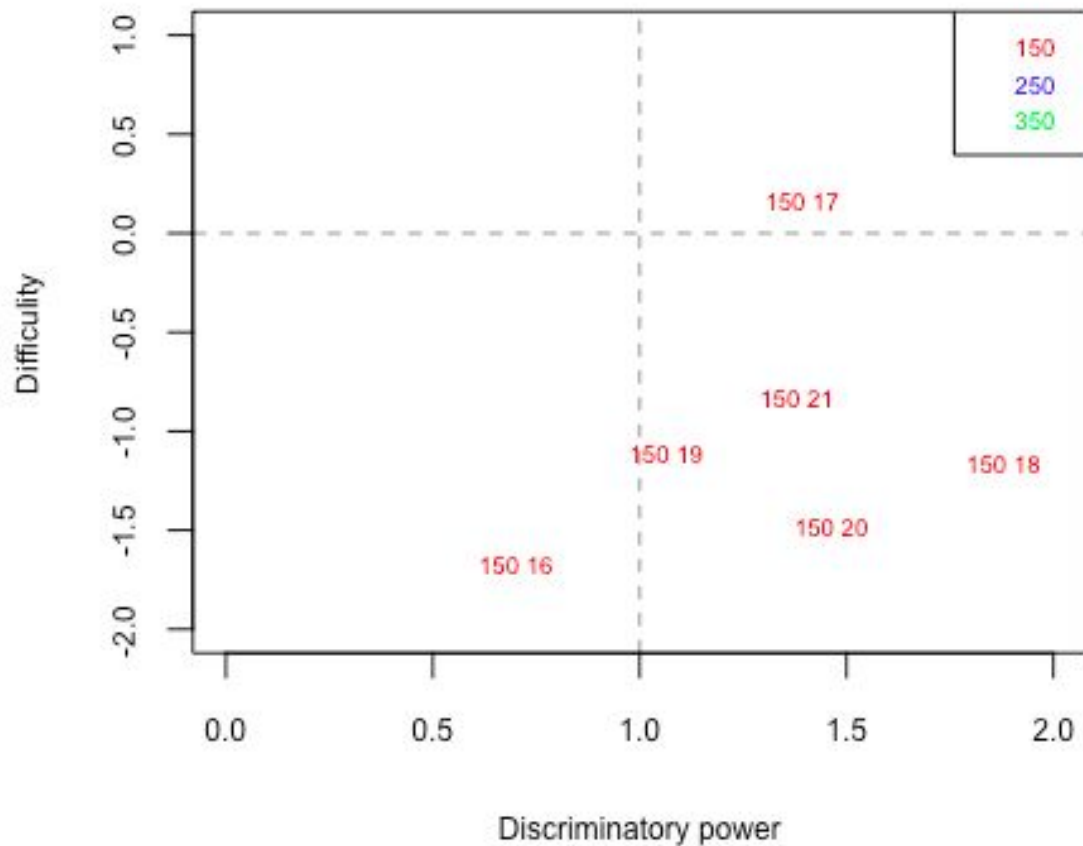
- Since 8 of the items have eigenvalues  $> 1$ , we only need 8 items to verify unidimensionality

Overall

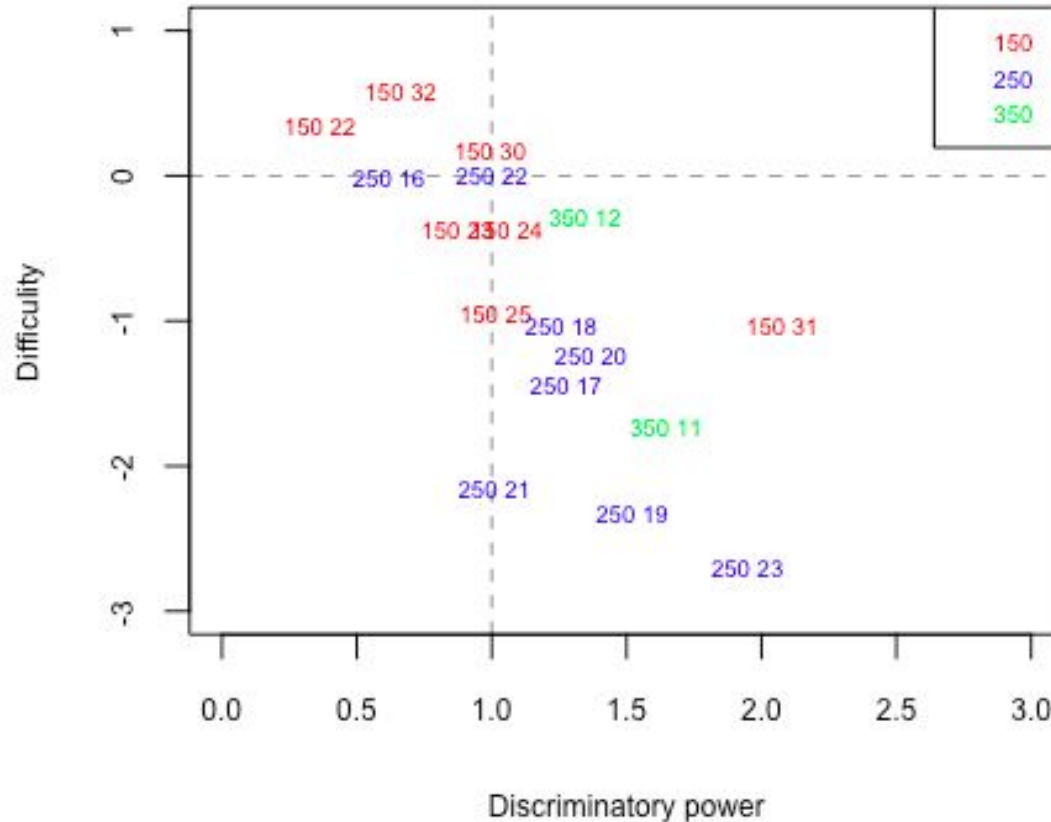
# Discriminatory power - Difficulty plot (150, 250, 350, dif\_level = 1-4)



## Discriminatory power - Difficulty plot (150, 250, 350, dif\_level=1)

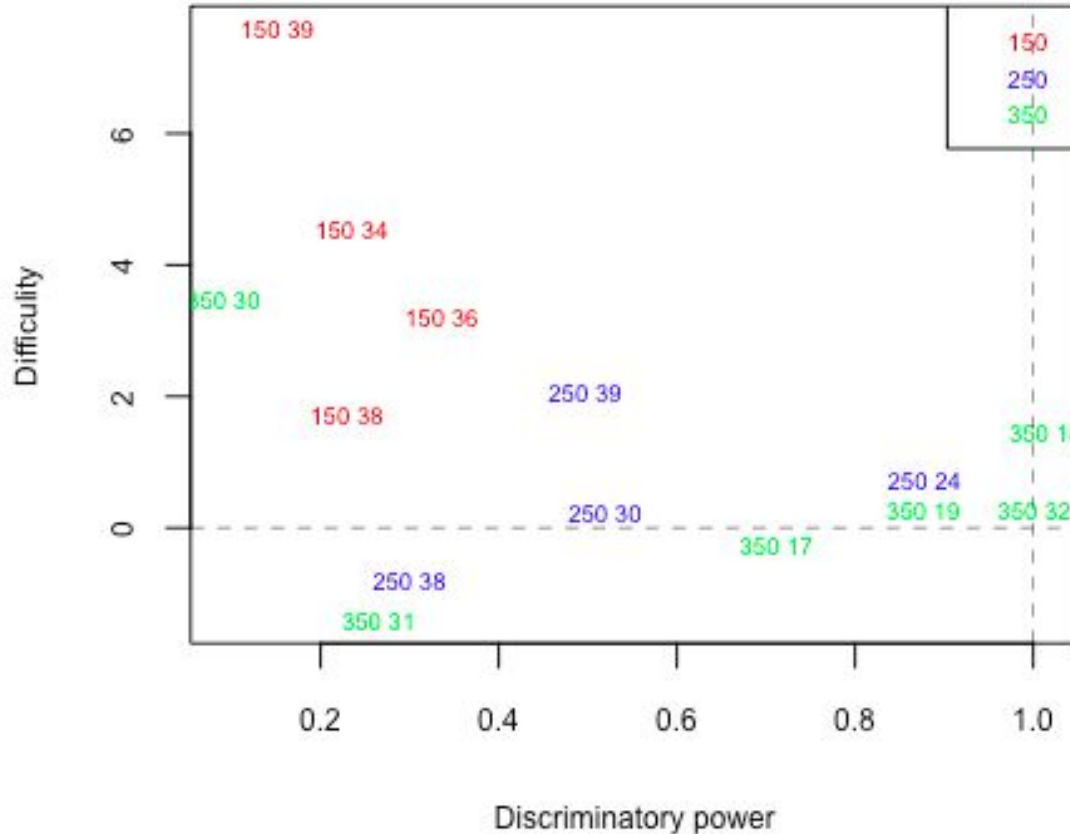


## Discriminatory power - Difficulty plot (150, 250, 350, dif\_level=2)



(After removing outliers)

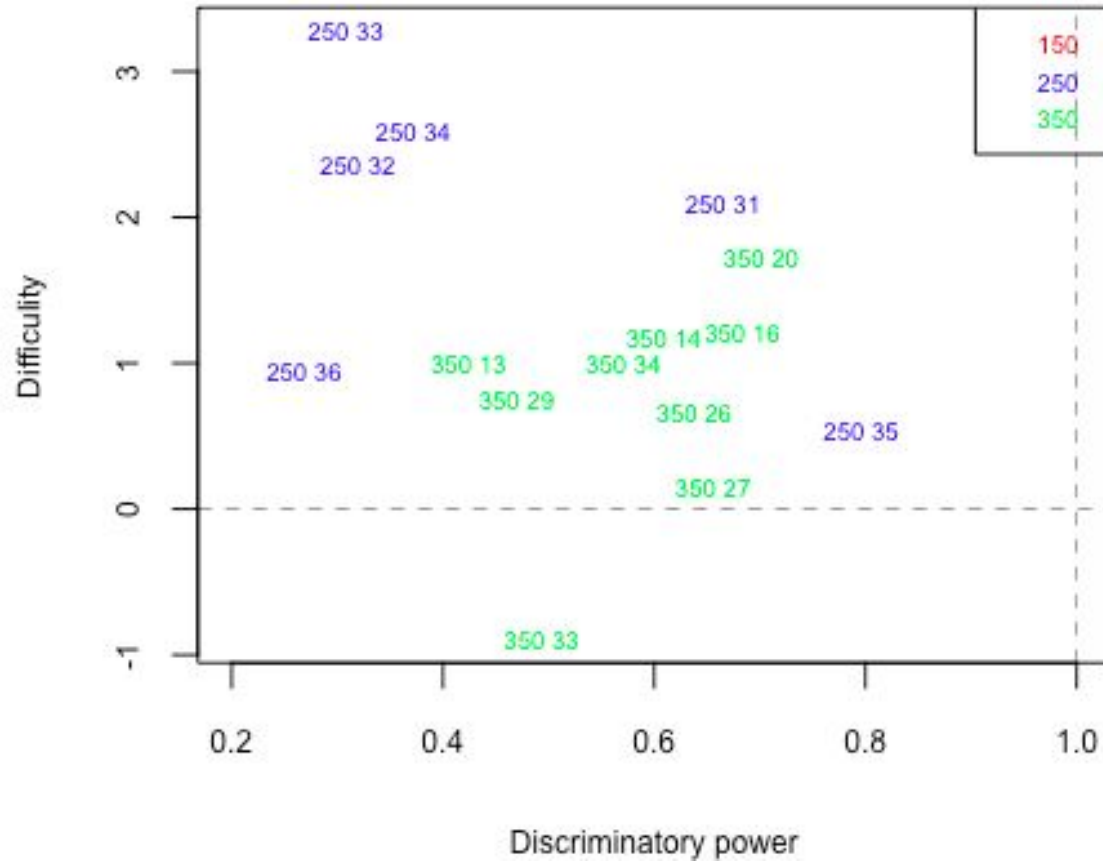
## Discriminatory power - Difficulty plot (150, 250, 350, dif\_level=3)



(After removing outliers)



## Discriminatory power - Difficulty plot (150, 250, 350, dif\_level=4)



(After removing outliers)